



# Renewables Overview

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Opportunities for Renewables Workshop  
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# Presentation Outline

Federal Energy Management Program

- FEMP Overview
- Federal Renewable Goals
- Renewable Energy Programs
- FEMP Support for Federal Agencies

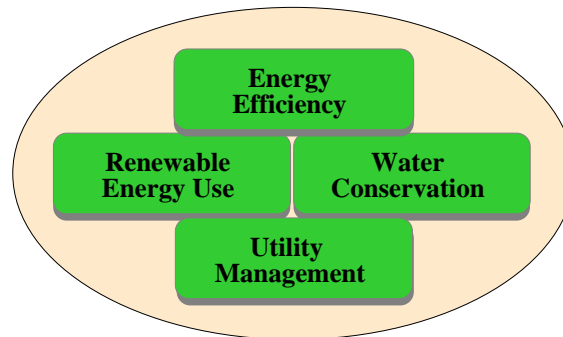
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# Mission

Federal Energy Management Program

FEMP works to reduce the cost of Government by advancing energy efficiency and water conservation, promoting the use of renewable energy, and managing utilities at Federal sites.



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# Energy Context

Federal Energy Management Program

- \$8 billion on total Federal energy bill
  - 500,000 buildings
  - Consumes 1.5% of nation's electricity
- Three major end-use sectors:
  - Buildings & Facilities, \$3.4 billion
  - Energy Intensive Operations, \$0.6 billion
  - Vehicles & Equipment, \$3.9 billion





# Federal Energy Management Goals

Federal Energy Management Program

- Reduce energy consumption
  - Facility energy per square foot to be reduced by 30 percent in 2005 and 35 percent in 2010 relative to 1985
  - Industrial/laboratory energy to be reduced by 20 percent in 2005 and 25 percent in 2010 relative to 1990
- Expand use of renewable energy
  - 2.5% of Federal facility electricity consumption by 2005
  - 2,000 solar roofs by 2000; 20,000 by 2010
- Implement best management practices for water conservation in 80% of Federal facilities by 2010
- Reduce greenhouse gas emissions 30 percent by 2010 compared to 1990

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Sec. 201. Greenhouse Gases Reduction Goal. Through life-cycle cost-effective energy measures, each agency shall reduce its greenhouse gas emissions attributed to facility energy use by 30 percent by 2010 compared to such emissions levels in 1990. **(1990-Kyoto agreement base year)**

Sec. 202. Energy Efficiency Improvement Goals. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per gross square foot of its facilities by 30 percent by 2005 and 35 percent by 2010 relative to 1985.

Sec. 203. Industrial and Laboratory Facilities. Through life-cycle cost-effective measures, each agency shall reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990.

Sec. 204. Renewable Energy. Each agency shall strive to expand the use of renewable energy within its facilities and in its activities by implementing renewable energy projects and by purchasing electricity from renewable energy sources. In support of the **Million Solar Roofs** initiative, the Federal Government shall strive to install 2,000 solar energy systems at Federal facilities by the end of 2000, and 20,000 solar energy systems at Federal facilities by 2010. **First goal of 2,000 already met with DOD alone having over 2,500 installations.**

Sec. 205. Petroleum. Through life-cycle cost-effective measures, each agency shall **reduce the use of petroleum within its facilities. 66% reduction since 1985**

Sec. 206. Source Energy. The Federal Government shall strive to reduce total energy use and associated greenhouse gas and other air emissions, as measured at the source. To that end, agencies shall undertake life-cycle cost-effective projects in which source energy decreases, even if site energy use increases. Agencies will receive credit toward energy reduction goals through guidelines developed by DOE.

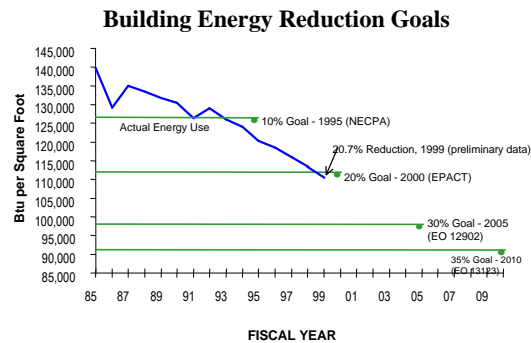
Sec. 207. Water Conservation. Through life-cycle cost-effective measures, agencies shall reduce water consumption and associated energy use in their facilities to reach the goals set under section 503(f) of this order.



## Progress Toward Buildings Goal

Federal Energy Management Program

- FY 1999 data indicates that the Federal Government exceeded the FY 2000 goal *one year early*.



- In constant dollars, building energy costs in 1999 were \$3.4 billion; 39.5% less than 1985 expenditures of \$5.6 billion.
- As of FY 1999, the Federal government reduced petroleum use in Federal facilities by 67% relative to 1985.

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Government's current energy intensity is 109,000 Btu/square foot

DOD is 108,560

Average private sector office building: 103,000.



## EO 13123 Renewable Usage Goal

Federal Energy Management Program

- 2.5% of federal facilities electricity consumption from new renewable energy sources by 2005
- Renewable electricity purchases can be credited towards energy efficiency goals

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Current use approximately 175 Gwh

Goal translates to 1,355 Gwh

(equivalent to about 500 MW of wind energy capacity)



## Options for Meeting Federal Goal

Federal Energy Management Program

### **Low energy design for new buildings**



### **On-site power generation**

### **Renewable Power Purchases**



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Sustainable/passive solar design counts towards renewables goal

-Run model (such as DOE - 2) and report energy use for conventional building for same location versus actual energy use. Difference counts towards goal.





## Other Renewable Usage Goals

Federal Energy Management Program

- Wind Program Goal
  - Entice federal agencies to purchase 5% of electricity from wind by 2010
- DOE Secretarial Directive
  - 3% of DOE electricity from non-hydro renewable energy by 2005 and 7.5% by 2010

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## Solar Program

Federal Energy Management Program

- Federal Solar Goals
  - 2,000 systems installed by 2000 (done)
  - 8,000 systems installed by 2005
  - 20,000 systems installed by 2010

- HECO is program partner



**Solar** - As of RWG April 19, 2000. Over 1,745 solar energy systems since June of 1997. 1,682 are Solar Hot Water Systems, 58 PV and 5 transpired solar thermal collectors. **HECO involved in ~half (most DOD)!**

Agency	Number of Systems
Department of Commerce	6
Department of Defense	1,162
Department of Energy	7
Department of Health & Human Services	1
Department of Interior	30
Department of Justice	1
Department of State	317
Department of Transportation	89
Environmental Protection Agency	4
Federal Emergency Management Agency	2
General Services Administration	10
NASA	1
National Science Foundation	3
United States Postal Service	9

**Why:** Enhance US Lead in the Global Solar Market  
Stimulate market demand for solar in order to drive price down  
Create 70,000 high tech jobs



# Wind

Federal Energy Management Program

1979: 40 cents/kWh

2000: 4-6  
cents/kWh

- Increased
- R&D Advances
- Manufacturing



NSP 107 MW Lake Benton wind farm  
4 cents/kWh (unsubsidized)

2007 Goal: 2-4 cents/kWh

GPS 8/7/00

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**Ed Cannon will cover wind in detail later in the day.**

Costs have dropped from 8 cent/kWh to less than 4 cents in 1995

Expected cost of 2.5-3.0 cents per kWh within a few years.

Some advances such as new blade design have increased efficiency,

Most of continued costs savings due to:

1. Cost of turbine goes up directly with the size of the turbine, but power output goes up with the square of the size. Also, taller turbines catch higher winds. According to ZOND, over the last 14 years, turbine costs have increased 8x, but power output has increased 56x
2. As more turbines are needed, the economies of scale bring down manufacturing costs. Zond is producing 2-3 turbines per day.

Because the costs are close to conventional fuels already, many utilities are looking at this since there is a small differential that the environmental benefits and public demand are pushing them over the edge.

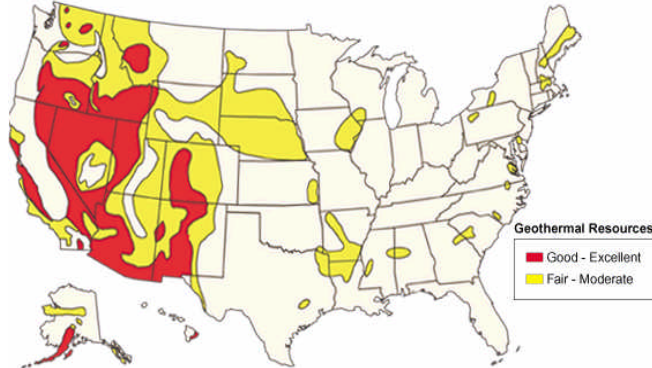
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Rural Economic Benefits -- in midwest the turbines take up less than 1% of the land, and farmers and ranchers still use the land. But they also receive revenue of around \$2000/yr per turbine.



# Geothermal Program

Federal Energy Management Program



## Program Goals

- 10% of electricity in western states by 2020
- 7 million homes using geothermal by 2010
- Double number of states with geothermal facilities to 8 by 2006

## State Electricity Production

- **Hawaii – 30 MW**
- California – 2500 MW
- Nevada – 200 MW
- Utah – 40 MW

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## Power and Heat Generation in US

- 150,000 MW Potential
- 2800 MW electric generation installed
- 500 MW direct thermal use

**Federal Example** - Coso Navy China Lake site. 160 MW on Navy land (250 MW total)

<http://energy.navy.mil/success/geotherm.htm>

## ADVANTAGES TO THE NAVY AND NAWS, CHINA LAKE

1. From 1987 through 1993, the Naval Weapons Center (now NAWS, China Lake) received direct reductions in its electricity bill totaling \$24.2 million.

Saving for 1993 = \$4.2 million - 33.3% reduction in electrical energy cost.

2. In cooperation with private industry, NAWS China Lake has promoted the development of its geothermal resource in a way that ensures continued Navy control of the Station's RDT&E ranges.

3. Coso production is equivalent to 16% of all electricity consumption by Navy shore facilities. This is a significant step toward meeting the requirements of CNO directives regarding the conversion of Navy shore facilities to alternate energy.



# Biomass Program

Federal Energy Management Program

- Goal - Triple use of biobased products and bioenergy by 2010



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## **Biomass Options (Chandra will cover these options also)**

- 1) Direct combustion -- 7500 MW installed in the U.S.
- 2) Co-firing of wastes -- demonstration phase
- 3) Gasification, pyrolysis -- under development
- 4) Landfill gas

## **Biomass Gasification Costs**

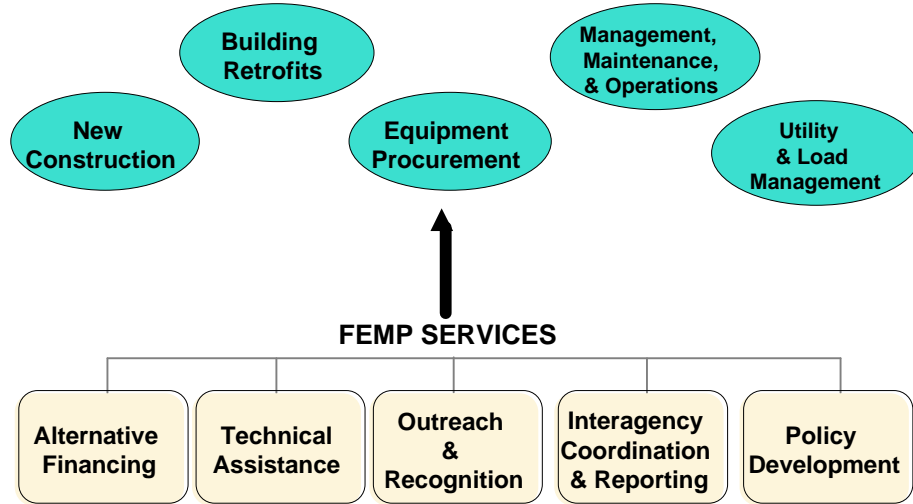
1995 - 8 cents/kwh  
2000 - 7 cents/kwh  
2010 - 6 cents/kwh

Biofuels also option - ethanol, etc



# Targeting Key Energy Opportunities

Federal Energy Management Program



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# Project Financing

Federal Energy Management Program

- ESPC and Super ESPC
- Utility Partnerships
- Agency Appropriations



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## FEMP Technical Assistance

Federal Energy Management Program

- SAVEnergy Audits
- Design Assistance
- FEMP Tools/Training
- Federal Relighting Initiative
- Renewable Energy Program
- New Technology Demonstration Program

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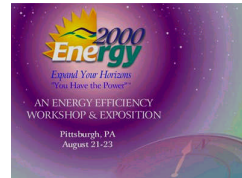
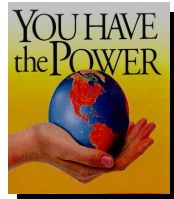




## Communication & Outreach Products

Federal Energy Management Program

- FEMP Focus Newsletter
- *You Have The Power* Awareness Campaign
- Special Awareness Materials
  - Natural Gas, Water, and Electric Load Reduction
- FEMP Web Site
  - <http://www.eren.doe.gov/femp>
- EREC Clearinghouse



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- 56% increase in web site usage
- Will do another Electricity similar campaign this spring
  - Materials in such high demand temporarily ran out
- 18,722 inquiries
- In 2000, 95,816 FEMP products distributed (FTA, Case studies, awareness products, PEERs, Technology Fact Sheets, UESC materials)



## Additional Resources

Federal Energy Management Program

- **FEMP Help Desk: 800-363-3732**
- **FEMP HQ Office: 202-586-5772**
- **DOE Regional Office FEMP Team**
- **DOE National Laboratory Liaisons**
- **Renewables Course**
- **“Energy 2001” - FEMP Annual Conference  
(June 4-6 in Kansas City)**
- **Utility Financing Workshops**

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